importance in practical work, is excellent. The illustrations of gas-fired kilns, on pp. 81–4, should prove of great value to the English manufacturer, who, so far, has made little use of continental improvements in methods of firing.

The chapter dealing with pyrometry and pyroscopes is also well done, and the discussion of the value of the "Seger" cone is singularly clear and accurate.

We can cordially recommend the work to all who are interested, either as manufacturers or as users of refractory materials, and it would be a still greater pleasure to note the appearance of an English work as comprehensive in scope and plan.

WILLIAM BURTON.

BACTERIOLOGY: GENERAL AND SPECIAL.

(1) *Agricultural Bacteriology, Theoretical and Practical.* By Prof. John Percival. Pp. x+408. (London: Duckworth and Co., 1910.) Price 7*s.* 6*d.* net.

(2) *A Text-Book of General Bacteriology.* By Prof. W. J. Frost and Prof. E. F. McCampbell. Pp. xvii+340. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1910.) Price 7*s.* net.

(3) *Die Eisenbakterien.* By Prof. Hans Molisch. Pp. vi+83. (Jena: Gustav Fischer, 1910.) Price 5 marks.

(4) *The Sources and Modes of Infection.* By Dr. C. V. Chapin. Pp. ix+399. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1910.) Price 12*s.* 6*d.* net.

(1) WE have read this book with much interest. The plan of it is well conceived, and it will serve not only as a useful text-book on agricultural bacteriology, but also as an excellent introduction to general bacteriology for those who are non-medical and do not wish to specialise in the medical and pathological side of bacteriology.

In the opening chapters a general account is given of the bacteria, their physiology, morphology, and classification, and the methods employed in isolating, cultivating, and studying them. Fermentation and enzyme action are then briefly discussed, including putrefaction. Next an excellent account is given of the bacteriology of soil, of nitrification and denitrification, and of the fixation of nitrogen, and, finally, the bacteriology of manure, milk, cream, butter, and cheese is dealt with. Considerable space is rightly devoted to milk and milk products, and the subjects of the sources of bacteria in milk, the fermentations occurring in milk, the filtration, cooling, pasteurisation, and sterilisation of milk, milk and its relation to disease, milk standards, cream and cream ripening, the bacterial content, flavour, and defects of butter, and the ripening of cheese are adequately described. A final chapter is devoted to the yeasts and moulds. Throughout the book series of excellent practical exercises for the student to work out are attached to all the sections. A few errors appear which will need correcting in a future edition. The *B. lactis aërogenes* is described on p. 10 as Gram positive, on p. 275 it is correctly stated to be Gram negative; on pp. 46–7, dealing with the neutralisation of culture media, it is stated that most bacteria grow best when the medium contains 1 per cent. of free normal acid; this, however, is true only when phenolphthalein is used as an indicator, and such media are alkaline to litmus. On pp. 96–8 the term "proteose" has been substituted several times for "proteolytic enzyme," entirely obscuring the meaning, and on p. 116 "nitrogen peroxide" appears in place of "hydrogen peroxide." The book is clearly printed, and contains a number of appropriate and well-executed illustrations.

(2) The authors state that there is no work in English on the subject of general bacteriology with the exception of the translation of Fischer's "Vorlesungen," and have attempted to supply this want in the present volume. On the whole the matter is presented in a readable and accurate form. The preliminary chapters dealing with the history of bacteriology might have been somewhat extended with advantage, and the omission of any mention of Lister's work on the lactic fermentation seems unpardonable. The chapters summarising the structure and composition of the bacterial cell and the morphology and classification of the bacteria are excellent. The methods employed in bacteriology and the general physiology of the bacteria are detailed at some length, and in the final portion of the book the biology of specialised groups of bacteria are briefly described. We think the authors have succeeded in their endeavour, and have produced a book which will be of considerable service as a general introduction to bacteriology.

(3) This is a monograph on a group of micro-organisms of considerable biological and practical interest. A majority are thread-forming species, and differ essentially in this respect, and also in the fact that they form conidia, from the true bacteria. They live in waters containing iron and have the capacity of "attracting" the iron from its solution and of depositing it around them as ferric hydroxide, which stains them brownish-red in colour. Ulitmately the organisms die, sink to the bottom of the water, and cause the reddish-brown colour so often seen at the bottom of streams and ponds. It has been suggested that some of the iron-ore deposits have been formed by the activity of "iron bacteria" living in the warm waters of an ancient sea. They also cause rusting of iron pipes and conduits and masses of their growth sometimes mechanically obstruct the flow of water in pipes. Prof. Molisch has collected in this monograph the descriptions of the known species; and with the attached bibliographies, illustrations, and plates, and details for their investigation, it forms a valuable survey of the group.

(4) Although this subject is dealt with in works on medicine, epidemiology, and bacteriology, and a special work on it might be considered superfluous, a perusal of its contents has convinced us that Dr. Chapin has compiled an extremely useful summary. The life of disease germs outside the body and the conveyance of infection by contact, fomites, air, food and drink, and insects, are fully considered. An im-

portant chapter deals with "carrier" cases, and considerable stress is laid on this mode of the spread of infective diseases. The limitations to the value of isolation for the prevention of the spread of infectious diseases are critically discussed, and the conclusion is reached that isolation is of far less value than was formerly believed. Bacterial and protozoal diseases are both dealt with, and full references are given to the literature.

R. T. H.

CHEMISTRY FOR MATRICULATION.

(1) *A Class-Book of Chemistry.* By G. C. Donington. Pp. xi+399. (London: Macmillan and Co., Ltd., 1911.) Price 3*s.* 6*d.*

(2) *Chemistry for Matriculation.* By Dr. G. H. Bailey and H. W. Bausor. Pp. viii+548. (London: W. B. Clive, 1910.) Price 5*s.* 6*d.*

(1) MR. DONINGTON'S volume is a very interesting attempt to combine a practical course on modern lines with a descriptive text-book. The arrangement of the matter is distinctly original and has been carefully thought out. Discussion of more abstract topics, such as the atomic theory, Avogadro's hypothesis and valency, is postponed to a late stage in the book, while no chemical formula appears until p. 283. The preference thus given to a more descriptive treatment of the science is all to the good in an introductory class-book of this kind. In the early chapters the author deals very appropriately with the physical operations and physical properties which are used in the purification and characterisation of individual substances, such as solution, crystallisation, distillation, determination of melting points and boiling points, measurement of volume and density of gases. The first topics of a definitely chemical nature to which the reader is introduced are "acids and alkalis," "neutralisation," "rusting" and "burning," "active and inactive constituents of air," "elements and compounds." It must not be supposed that this descriptive treatment involves the suppression of the quantitative aspect of chemical changes. On the contrary, the author contrives in the earlier part of the volume to introduce the pupil by the way to the fundamental quantitative facts of chemistry.

While the general arrangement of the subject-matter is excellent, it may be doubted whether the author attains his object of providing a basis for teaching by research methods. With this in view, each topic is, as far as possible, introduced by the suggestion of experiments to be carried out by the pupil, these leading up to the solution of various problems. The paragraphs, however, in which appropriate experiments are indicated are followed by an authoritative description of all the facts bearing on the question. Various experiments, for instance, relative to the nature and cause of iron rusting are suggested, and the results obtained are supposed to enable the pupil to answer such questions as "Does iron rust in dry air?" "Does water *only* cause iron to rust?" "Is the rusting of iron a chemical or a physical change?" The correct answers, however, are supplied in the descriptive paragraphs which follow, and it is plain that the replies given by the pupil under such conditions cannot be unprejudiced.

The selection of practical exercises is excellent, and the course has stood the test of actual experience. The illustrations include portraits of such pioneers as Priestley, Lavoisier, Davy, and Faraday.

A curious error is the spelling of Avogadro's name throughout as Avagadro.

(2) The second volume under review belongs to the "University Tutorial Series," and is based on Dr. Bailey's earlier work, "The New Matriculation Chemistry." The authors aim at a combination of the heuristic and didactic methods of teaching, and practical exercises for the pupil are accordingly interwoven with the text.

The book begins with an introductory course in which "special care has been devoted to the treatment of the Laws of Constant and Multiple Proportions, Avogadro's Hypothesis, and the meaning and use of Chemical Formulæ and Equations." There is much, however, in the discussion of these topics that is open to criticism. Thus, for instance, Avogadro's hypothesis is described on p. 141 as a "law," the word molecule is used in different senses without any explanation, atomic weights are tabulated and used before the idea of "equivalents" is introduced, and hydrogen is taken as the standard of atomic weights. According to the preface, the book aims at providing a course of fairly detailed study in chemistry, and yet no information is given as to practical methods of deducing atomic weights from equivalents; there is, for instance, no reference to Dulong and Petit's law.

The choice of practical exercises to be performed by the student is not always wise. Dropping a piece of sodium about the size of a pea into water, and demonstrating the low ignition point of benzoline, are experiments which in the hands of beginners might have unpleasant consequences, while such exercises as the preparation of ethylene and the conversion of yellow phosphorus into the red variety are not suitable for the matriculation student.

J. C. P.

OUR BOOK SHELF.

Trattato di Chimica Inorganica generale e applicata all' Industria. By Prof. E. Molinari. Terza edizione. Pp. xvii+924. (Milano: U. Hoepli, 1911.) Price 16 lire.

WHEN the first edition of this work appeared in 1905 its many excellent and novel features were commended in the full review which was published in NATURE of February 29 of that year. That these qualities were widely appreciated is shown by the fact that a second edition was called for within a year, and a third edition is now being issued. The present edition contains a very large amount of new matter, above 200 pages having been added to the text, fifty-six of which belong to the general introductory section, and deal with such subjects as mass-action, equilibrium, dissociation, and the phase rule. That the revision of the special section has kept pace with the march of modern industrial development is shown by the very thorough alterations which have been made